



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/816,576

03/24/2004

Hou Tee Ng

ARC-15042-2

9400

25186

7590

04/06/2006

NASA AMES RESEARCH CENTER  
ATTN: PATENT COUNSEL  
MAIL STOP 202A-4  
MOFFETT FIELD, CA 94035-1000

EXAMINER

NGUYEN, THANH T

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 04/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

18

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/816,576	NG ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Thanh T. Nguyen	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 January 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3,5 and 7-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 7-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Response to Arguments*

Applicant's arguments with respect to claims 1-3, 5, 7-16 have been considered but are moot in view of the new ground(s) of rejection.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-3, 5, 7-16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The limitations “providing an electrically ***non-conductive layer*** of a first selected material having a first selected thickness, on an exposed surface of a substrate of selected substrate material”, “***organometallic***”, “***to prevent migration of the MeNW material***”, and “***etching process***” in claims 1, and “diffusion barrier material to be an electrically ***non-conductive material***” in claim 15 contain subject matter which was not described in the original specification. It is suggested to delete the limitations.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5, 7-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li (U.S. Patent No. 2003/0189202) in view of Jin (U.S. Patent Publication No. 2004/0071951) and Nakano et al. (U.S. Patent Publication No. 2001/0030366).

Referring to figures 2a-6, Li et al. teaches a method for fabricating an electrical connection, the method comprising:

providing an electrically conductive layer of a selected material (14), having a selected thickness, on an exposed surface of a substrate (10) of selected substrate material (see figure 4a);

depositing a thin patterned array, including two or more spaced apart array elements, of metallic nanowire (MeNW) catalyst material of a selected thickness on an exposed surface of the conductive layer so that a portion of the conductive layer lies between the substrate and each element of the catalyst array (20, see figure 4c, paragraph# 42);

providing a gas or vapor of a selected metallic material around the catalyst patterned array, and allowing at least one MeNW to grow, substantially perpendicular to a plane II of the

Art Unit: 2813

conductive layer, between each element of the catalyst array and the conductive surface (34, see figure 4d, paragraph# 43);

depositing an insulation layer of a selected insulation material over the catalyst array and around the at least two MeNWs so that a gap between at least two adjacent MeNWs contains the insulation material (36, see figure 4e, paragraph# 44);

applying a chemical mechanical polishing process to remove the catalyst array, a fraction of each of the at least two MeNWs, and a fraction of the insulation layer so that at least two MeNWs have an end exposed (see figure 4f, paragraph# 48).

Regarding to claim 2. applying an electrical field E1, substantially perpendicular to said plane II, as said at least one MeNW is grown (see paragraph# 36, 43).

Regarding to claim 3. applying an electrical field E2, substantially parallel to said plane H, as said at least one MeNW is grown (see paragraph# 36, 43).

Regarding to claim 8. conductive layer material from a group of materials that includes Cu, Ag, Au, Pt, Pd, Ni, Fe, Co, Ir, Ti, Zr and a metal-doped silicide (paragraph# 41).

Regarding to claim 9. catalyst layer material from a group of materials that includes Al, Au, Ag, Ni, Ir, Mo, Pt and Pd (paragraph# 56).

Regarding to claim 10. metallic material for said at least two MeNWs from a group of materials that includes Cu,  $Cu_xO_y$ , Al,  $Al_wCu_z$ , Ag, Au, R and Pd, where w, x, y and z are positive numbers (see paragraph# 27).

Regarding to claim 11. insulation material from a group of materials that includes Si,  $\text{Si}_a\text{O}_b$  and  $\text{Si}_c\text{N}_d$ , where a, b, c and d are selected positive numbers (paragraph# 44).

Regarding to claim 14. providing at least one of said at least two MeNWs with a diameter, measured in a plane substantially parallel to said plane II, in a range 1-250 nm (paragraph# 31).

However, Li does not teach diffusion barrier material made of TaN or TiN.

Jin teaches a method of forming a nanowire (50) and coating the nanowire with a protective film (51, see figure 5a). Nakano et al. teaches the protective film made of TaN or TiN (see paragraph#12).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would form a protective layer TaN or TiN to protect the nanowire in process of Li et al. as taught by Jin and Nakano et al. because the process would protect the underlying layer as well as act as a diffusion barrier.

It would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made to optimize the concentration of hydrogen within the dielectric layer, since it has been held that where the general conditions of a claim are disclosed in the prior art (i.e.- thickness of catalyst layer in a range 0.1 - 20 nanometers, and thickness of conductive layer in a range 0.2-250 nm.), discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233 (CCPA 1955).

The specification contains no disclosure of either the critical nature of the claimed arrangement (i.e.- thickness of catalyst layer in a range 0.1-20 nanometers, and thickness of conductive layer in a range 0.2-250 nm) or any unexpected results arising therefrom. Where

patentability is said to be based upon particular chosen limitations or upon another variable recited in a claim, the applicant must show that the chosen limitations are critical. In re Woodruff, 919 F.2d 1575, 1578 (FED. Cir. 1990).

Therefore it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would optimize the thickness range of the catalyst layer and the conductive layer in process of Li et al. in order to optimize the process.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Nguyen whose telephone number is (571) 272-1695, or by Email via address Thanh.Nguyen@uspto.gov. The examiner can normally be reached on Monday-Thursday from 6:00AM to 3:30PM.

Art Unit: 2813

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, can be reached on (571) 272-1702. The fax phone number for this Group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956 (**See MPEP 203.08**).

A handwritten signature in black ink, appearing to read 'Thanh', with a long horizontal stroke extending to the left and a series of loops to the right.

Thanh Nguyen  
Patent Examiner  
Patent Examining Group 2800

TTN